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⑤④ Radiating convection heating apparatus.

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**DE-A- 3 915 932**  
**DE-U- 6 906 398**  
**DE-U- 7 040 946**

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**EP 0 482 494 B1**

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## Description

The present invention relates to a radiating convection heating apparatus.

As is known, so-called heater fans are already commercially available and are substantially constituted by an electric resistor arranged in a flow of air generated by a fan which thereby facilitates the rate of heat exchange from the resistor toward the environment, as see for example DE-U-6 906 398.

These solutions have the disadvantage of not allowing a good heating of the environment, since the presence of an electric resistor exposed to the air does not allow to provide uniform heating effects and the heating element, by having no heat inertia, in practice ceases its effect immediately as soon as the power supply is disconnected.

So-called oil radiators are also known; said radiators are substantially constituted by a body which is composed of a plurality of columns which in practice define a chamber for containing diathermic oil which is heated by a resistor which is generally arranged in a lower part of the chamber (for example, EP-A-0 292 441).

This solution creates the advantage whereby a considerable mass is heated which acts as a thermal buffer which maintains a production of heat toward the environment even when the electric resistor is switched off.

However, in these embodiments it is not possible to increase heat exchange by means of forced ventilation, due to the difficulty encountered in having a good distribution of the air flow when said air flow is directed against the columns of the radiator which in practice constitute the heating element.

The aim of the invention is indeed to solve the above described problem by providing a radiating convection heating apparatus which, despite having a mass of diathermic oil which is heated by a resistor, allows to also use a forced ventilation which facilitates heat exchange without thereby creating non-uniformities in heating.

Within the scope of the above aim, a particular object of the invention is to provide a heating apparatus which allows to optimize heat exchange by using forced ventilation, achieving a significant increase in the outward production of heat.

Another object of the present invention is to provide a heating apparatus which allows to humidify the environment, thus restoring the natural equilibrium in said environment.

Not least object of the present invention is to provide a heating apparatus which can be easily obtained starting from commonly commercially available elements and materials and is furthermore competitive from a merely economical point of view.

This aim, these objects and others which will become apparent hereinafter are achieved by a radiat-

ing convection heating apparatus, according to the invention, which comprises two side wall compartments between which a plurality of column-like elements is arranged, said elements extending between a lower manifold and an upper manifold so as to define a containment chamber for diathermic oil which can be heated by means of an electric resistor, characterized in that it comprises a fan the delivery whereof is connected to a heat exchange duct which extends inside said upper manifold and exits at one of said side wall compartment.

Further characteristics and advantages will become apparent from the description of a preferred but not exclusive embodiment of a radiating convection heating apparatus, according to the present invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic front elevation view of the heating apparatus according to the invention;

figure 2 is a lateral elevation view of the heating apparatus;

figure 3 is a partially cutout view of the heating apparatus, illustrating the upper manifold and the heat exchange duct;

figure 4 is a sectional view of the fan;

figure 5 is a sectional view, taken along the line V-V of figure 4.

With reference to the above figures, the radiating convection heating apparatus according to the invention, which is generally indicated by the reference numeral 1, comprises two side wall compartments, respectively indicated by 2 and 3, which are advantageously but not necessarily mounted on castors 4. Between the side wall compartments 2 and 3 there is a plurality of column-like elements 5 which extend between a lower manifold 6 and an upper manifold 7, so as to define a chamber for diathermic oil which can be heated by means of an electric resistor which is generally arranged at the lower manifold 6.

An important peculiarity of the invention is constituted by the fact that in one of the side wall compartment, for example in the side wall compartment 2, there is a fan 10, the intake whereof is arranged at an opening 11 which allows to draw air at the interspace defined in the side wall compartment, so that the air is drawn in from below and is preheated by striking the face of the side wall compartment which is directed toward the heating elements.

The fan 10 is provided with an impeller 12, of a per se known type, advantageously with radial vanes, which feeds the flow of drawn air into a delivery duct 15 which is accommodated inside the side wall compartment 2 and is connected, in an upward position, to a heat exchange duct 20 which extends inside the upper manifold 7, so that in practice the air strikes the heating body from the inside, so that it undergoes an easy heating without dispersions or non-uniformities of flow toward the outside.

The heat exchange duct 20 exits at a grille 21 which is directed outward and is advantageously provided on the other side wall compartment 3.

Another important aspect of the invention is furthermore constituted by the fact that the heating apparatus, according to the invention, comprises a humidification unit, generally indicated by the reference numeral 30, which is constituted by a storage tank 31 and by a humidification tank 32 which are mutually connected by means of a lower duct 33 so as to obtain in practice two communicating vessels.

Inside the tank 32 there is a heating resistor 34 for humidification, which can be independently powered and allows to create steam in a limited region of water, since in practice only the humidification tank is heated, allowing a good delivery of humidification steam, which escapes by means of an upper grille, generally indicated by 40.

By means of the described arrangement, it is thus possible to provide a radiating convection heating apparatus which contains diathermic oil and offers the possibility of performing forced-ventilation heating, using the flow of the ventilation air inside the heating body, i.e. inside the heat exchange duct which is arranged coaxially inside the upper manifold.

In practice, the materials employed, as well as the dimensions and the contingent shapes, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

#### Claims

1. Radiating convection heating apparatus, comprising two side wall compartments (2,3) between which a plurality of column-like elements (5) is arranged, said elements (5) extending between a lower manifold (6) and an upper manifold (7) so as to define a containment chamber for diathermic oil which can be heated by means of an electric resistor, characterized in that it comprises a fan (10) the air delivery whereof is connected to a heat exchange duct (20) which extends inside said upper manifold (7) and exits at one (3) of said side wall compartments.
2. Heating apparatus according to claim 1, characterized in that said fan (10) is arranged inside one (2) of said side wall compartments.
3. Heating apparatus according to one or more of the preceding claims, characterized in that said

fan (10) has an intake (11) defined in the inter-space directed toward said heating elements in order to preheat the drawn air, taken from the lower part.

4. Heating apparatus according to one or more of the preceding claims, characterized in that said fan (10) is connected to a delivery duct (15) which is connected to said heat exchange duct (20).
5. Heating apparatus according to one or more of the preceding claims, characterized in that said heat exchange duct (20) extends coaxially inside said upper manifold (7).
6. Heating apparatus according to one or more of the preceding claims, characterized in that it comprises a humidification unit (30) which is provided with a heating resistor (34) for the humidifier which can be actuated independently of the electric heating resistor of the apparatus.
7. Heating apparatus, according to claim 6, characterized in that said humidification unit (30) has a storage tank (31) and a humidification tank (32) which are mutually connected by means of a lower duct (33) so as to define a communicating-vessel coupling, said electric resistor (34) for the humidifier being provided in said humidification tank (32).

#### Patentansprüche

1. Strahlendes Konvektionsheizgerät, das zwei Seitenwandfächer (2,3) umfaßt, zwischen denen eine Vielzahl säulenartiger Elemente (5) angeordnet ist, wobei sich die besagten Elemente (5) zwischen einer unteren Verzweigung (5) und einer oberen Verzweigung (7) erstrecken und so eine Kammer für diathermisches Öl definieren, das mittels eines elektrischen Widerstandes erwärmt werden kann, dadurch gekennzeichnet, daß es ein Gebläse (10) umfaßt, dessen Luftausblasöffnung mit einem Wärmeaustauschkanal (20) verbunden ist, der sich in der besagten oberen Verzweigung (7) erstreckt und in einem (3) der besagten Seitenwandfächer endet.
2. Heizgerät nach Anspruch 1, dadurch gekennzeichnet, daß das besagte Gebläse (10) in einem (2) der besagten Seitenwandfächer angeordnet ist.
3. Heizgerät nach einem oder mehreren der vorherigen Ansprüche, dadurch gekennzeichnet, daß das besagte Gebläse (10) einen Einlaß (11) besitzt, der im Zwischenraum definiert wird und in

Richtung auf die besagten Heizelemente hin gerichtet ist um die angesogene Luft vorzuwärmen, die vom unteren Teil stammt.

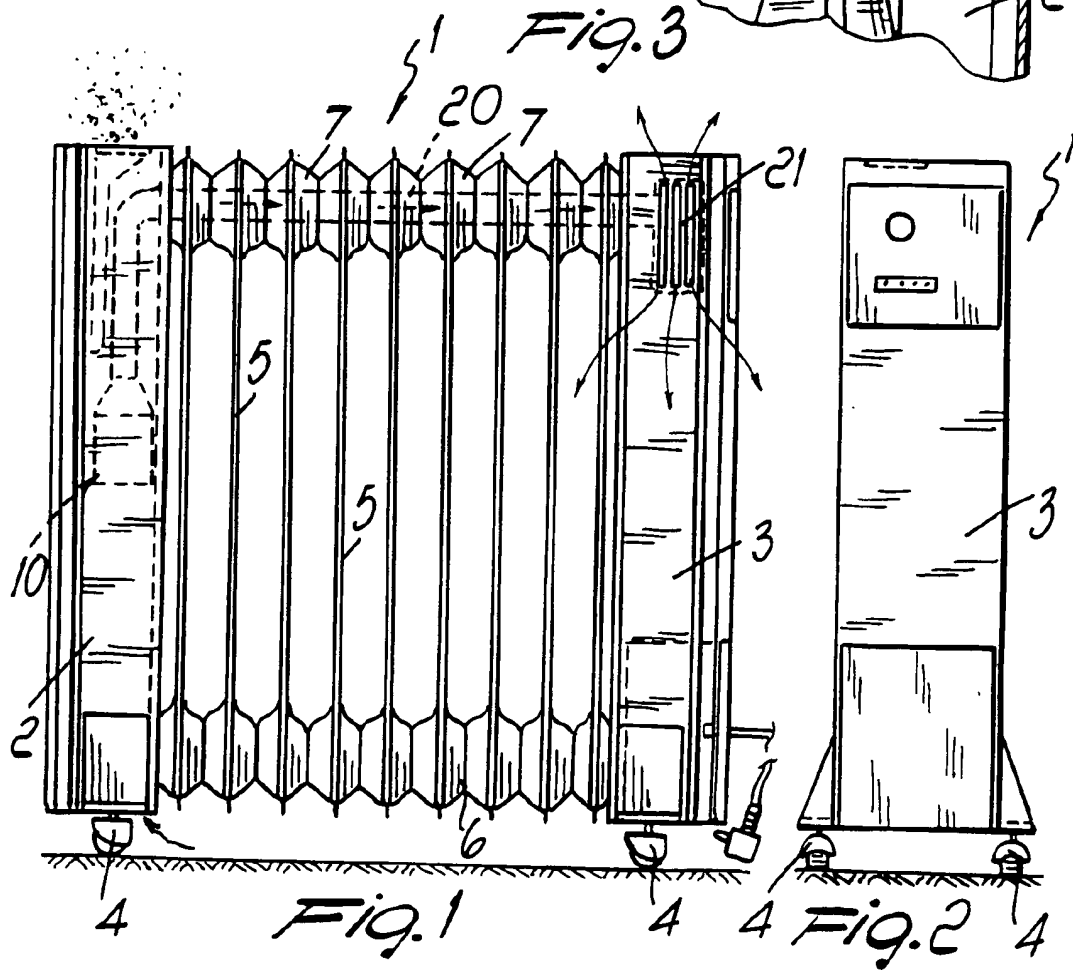
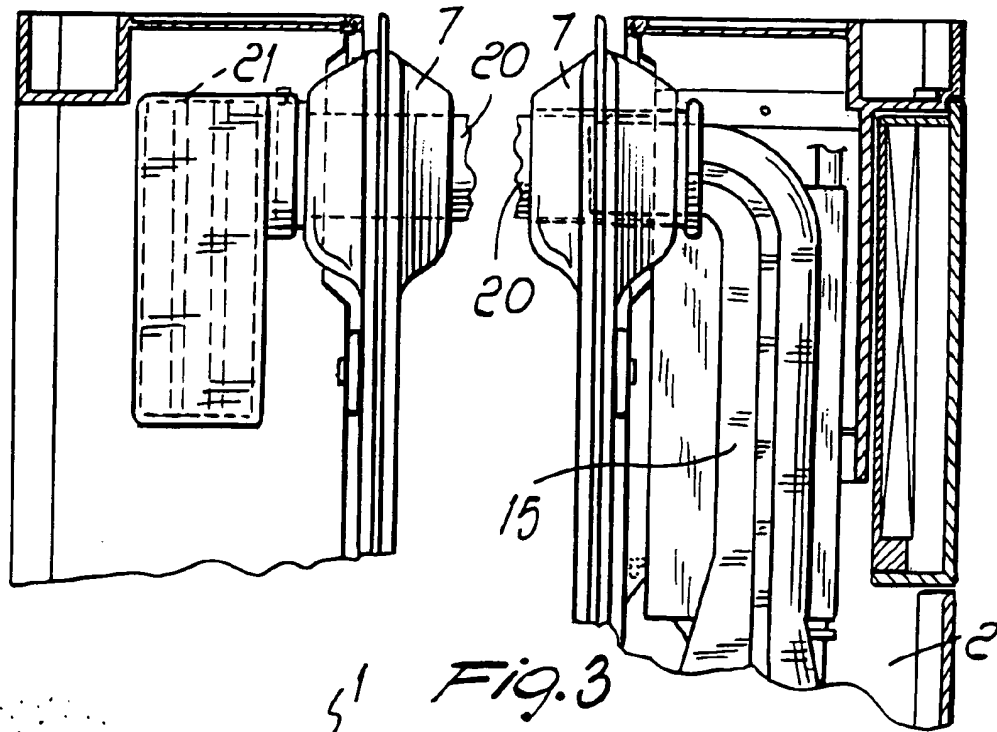
4. Heizgerät nach einem oder mehreren der vorherigen Ansprüche, dadurch gekennzeichnet, daß das besagte Gebläse (10) mit einem Zuführkanal (15) verbunden ist, der mit dem besagten Wärmeaustauschkanal verbunden ist.
5. Heizgerät nach einem oder mehreren der vorherigen Ansprüche, dadurch gekennzeichnet, daß sich der besagte Wärmeaustauschkanal (20) koaxial im Inneren der besagten oberen Verzweigung (7) erstreckt.
6. Heizgerät nach einem oder mehreren der vorherigen Ansprüche, dadurch gekennzeichnet, daß es eine Befeuchtungseinheit (30) umfaßt, die mit einem Heizwiderstand (34) für den Befeuchter ausgerüstet ist, der unabhängig vom elektrischen Heizwiderstand des Gerätes betrieben werden kann.
7. Heizgerät nach Anspruch 6, dadurch gekennzeichnet, daß die besagte Befeuchtungseinheit (30) einen Vorratstank (31) und einen Befeuchtungstank (32) besitzt, die miteinander mittels eines unteren Kanals (33) verbunden sind und auf diese Weise praktisch zwei kommunizierende Gefäße darstellen, wobei der besagte elektrische Widerstand (34) für den Befeuchter in dem besagten Befeuchtungstank (32) bereitgestellt wird.

#### Revendications

1. Radiateur de chauffage par convection comprenant deux compartiments (2, 3) latéraux entre lesquels sont disposés plusieurs éléments (5) en forme de colonnes, ces éléments (5) s'étendant entre un collecteur inférieur (6) et un collecteur supérieur (7) de manière à définir une chambre de retenue pour de l'huile qui peut être chauffée au moyen d'une résistance électrique, caractérisé en ce qu'il comprend une soufflerie (10) dont la sortie d'air est reliée à une conduite d'échange thermique (20) qui s'étend à l'intérieur du collecteur supérieur (7) et sort dans l'un (3) desdits compartiments latéraux.
2. Radiateur de chauffage selon la revendication 1, caractérisé en ce que la soufflerie (10) est disposée à l'intérieur de l'un des compartiments latéraux (2).
3. Radiateur de chauffage selon l'une quelconque des revendications précédentes, caractérisé en

ce que la soufflerie (10) comporte une entrée (11) délimitée dans l'espace intérieur dirigé vers les éléments chauffants dans le but de préchauffer l'air aspiré prélevé à la partie inférieure.

4. Radiateur de chauffage selon l'une quelconque des revendications précédentes, caractérisé en ce que la soufflerie (10) est reliée à une conduite de sortie (15) qui est elle-même reliée à la conduite d'échange thermique (20).
5. Radiateur de chauffage selon l'une quelconque des revendications précédentes, caractérisé en ce que la conduite d'échange thermique (20) s'étend dans une direction coaxiale à l'intérieur du collecteur supérieur (7).
6. Radiateur de chauffage selon l'une quelconque des revendications précédentes, caractérisé en ce qu'il comprend une unité d'humidification (30) qui est équipée d'une résistance (34) de chauffage de l'humidificateur qui peut être alimentée indépendamment de la résistance électrique de chauffage de l'appareil.
7. Radiateur de chauffage selon la revendication 6, caractérisé en ce que ladite unité d'humidification (30) comprend un réservoir de stockage (31) et une cuve d'humidification (32) qui sont reliés entre eux au moyen d'une conduite inférieure (33) de façon à définir des vases communicants, la résistance électrique (34) de l'humidificateur étant installée à l'intérieur de ladite cuve d'humidification (32).



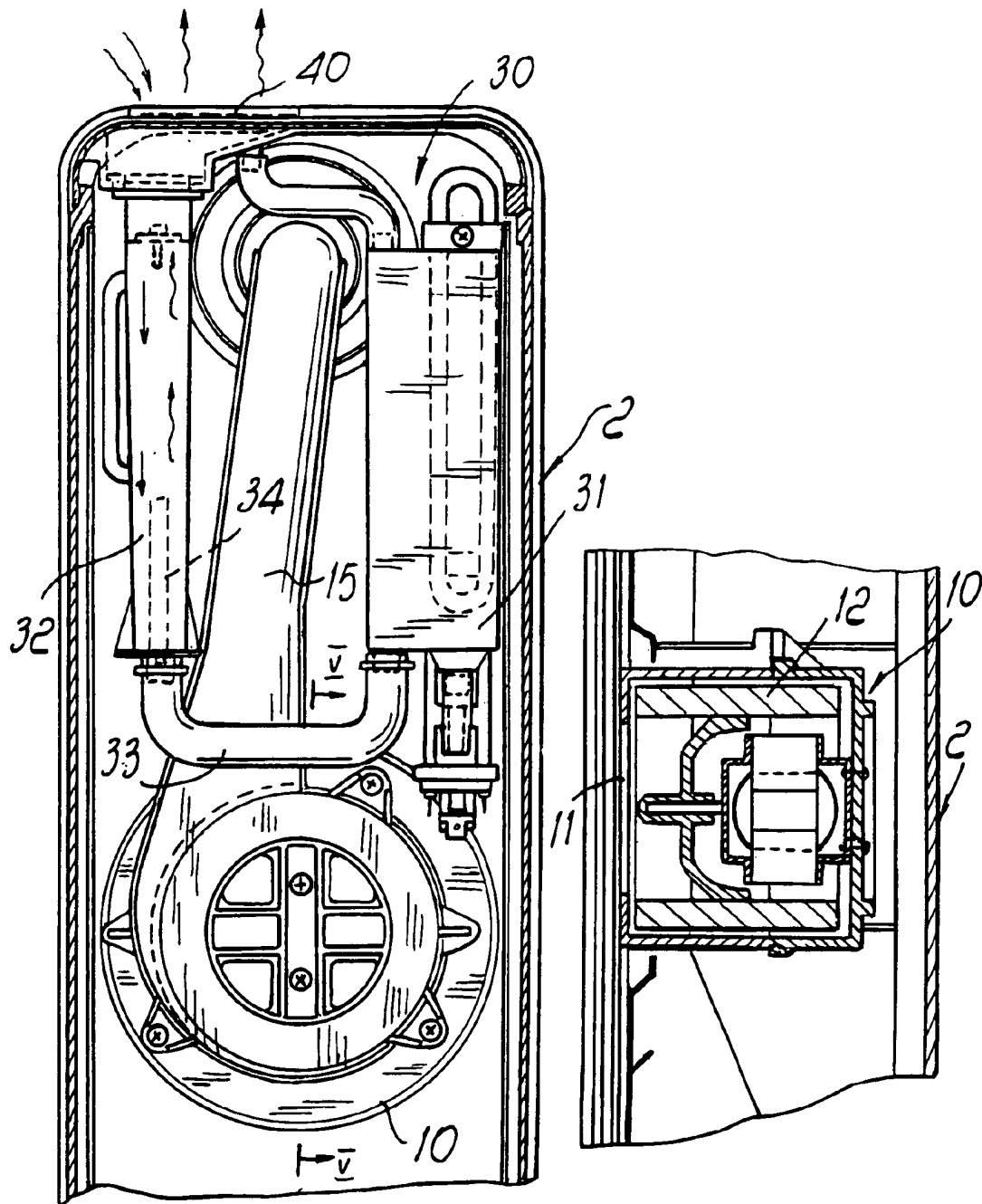


Fig. 4

Fig. 5